

PDF hosted at the Radboud Repository of the Radboud University Nijmegen

The following full text is a publisher's version.

For additional information about this publication click this link.

<http://hdl.handle.net/2066/74893>

Please be advised that this information was generated on 2017-12-06 and may be subject to change.

NiCE Working Paper 09-109

August 2009

**Capability and health functioning in Ethiopian
households**

NiCE working papers

Ramzi Mabsout

Nijmegen Center for Economics (NiCE)

Institute for Management Research

Radboud University Nijmegen

P.O. Box 9108, 6500 HK Nijmegen, The Netherlands

<http://www.ru.nl/nice/workingpapers>

ABSTRACT

This paper operationalises concepts from the capability approach to shed light on the relationship between capability and well-being. The subjects are Ethiopian women in partnership. From a recent nationally representative household survey, a decision making latent variable is estimated using a MIMIC (multiple indicators multiple causes) model. The main empirical hypothesis tested is the extent to which women who take more decisions in the household achieve better health. The answer is a conditional yes since the outcome depends ultimately on the type of health indicator used and the definition of decision making power.

Key words: Gender, capability approach, Ethiopia, health.

This is a draft and comments/suggestions are appreciated. For inputs and support I wish to thank Irene van Staveren, Ellen Webbink, Jeroen Smits, Jan Peil, Anita van de Kooij, Sílvia Pina Neves, Karolina Safarzynska the MPLUS and EQS teams, participants at the Kiel conference on Income Distribution and the Family, the NICE seminar at Nijmegen, the Happiness and Capability: Theory, Measurement and Policy workshop in Ravenstein, and the Feminist Economics annual meeting in Torino.

I. INTRODUCTION

In the early days of development health policy and family planning, assistance was administered on the assumption that availability of health facilities, contraceptive education, and information suffice to reduce mortality, national fertility, and promote socio-economic development. Despite considerable efforts, fertility and mortality rates have not fallen as expected and family planning had marginal impacts (Balk, 1994; Germain, 1975). Arguably, this failure was in part related to neglecting women's empowerment. Since then the literature on empowerment has grown significantly and advances on many fronts, including policy ones, have been made. Recent work accordingly reflects an interest towards exploring policies that enhance the demand side of health policy and family planning (Ensor and Cooper, 2004). There remains uncertainty however over the existence of a simple linear relationship between women's decision making in the household and their well-being. This paper therefore tests two hypotheses. The first relates to the contingency that emerges when the determinants of decision making power in households (income, assets, education) are not effective (Bruce and Dwyer, 1988; Hossain, 1998; Garikipati, 2008; Goetz and Sen Gupta, 1996; Odebode and van Staveren, 2007; Rahman, 1999). The second relates to the direct effects of decision making power on well-being.

The body of research in Presser (1997) and Smith (1989) explored the determinants of women's well-being yet little emerges on the impact of heterogeneity in decision making power. Furthermore, the implications of heterogeneity in decision making power are more acute in developing countries where gender norms are unfavorable to women. In such environments, additional empowerment can provoke punishment or is rendered ineffective by internalized preferences consistent with the interest of groups that benefit from the prevailing dominant norms (Agarwal, 1994; Sen, 1985:309-19). In Ethiopia, for example, Legovini (2006:142) reports women's awareness of their right is positively related to spousal beating. Yet, others insist, direct empowerment is necessary to improve well-being. Thus, in Ethiopia as well, Berhane et. al. (2001), Kabira et. al. (1997), among others, argue women's health cannot be improved unless they participate effectively in

decision making over resources and access to knowledge. Answering the two hypotheses suggested above will provide a possible answer to these apparently contradictory ideas.

Household decision making power in economics is captured indirectly as market power and outside options. Thus, it is not modeled explicitly and the sort of questioning above is rarely considered. Still, the critique of unitary household models opened the way for new approaches where heterogeneous members interact (Quisumbing and Maluccio, 2000). In unitary models, individual and household decisions are taken by a dictator or altruist head.ⁱ Heterogeneity was introduced not only in terms of different, possibly even conflicting, preferences and goals between members, but also in terms of power. But the possibility of conflicting interests does not rule out cooperation between members (Sen, 1990; Agarwal, 1997). Bargaining models however require decision making mechanisms. These mechanisms should encompass whenever possible both cooperation and conflict.

Decision making power is then explicitly modeled in what follows. The paper tests in a context of unequal gender norms how decision making power in households is instrumental for women's well-being (Kabeer, 2005; Thomas, et. al., 2002). The aim is to enrich existing insights on the pathways from decision making power to well-being where women are marginalized but important contributors to household and community life (Pankhurst, 2002:7). The paper follows the lead of previous research that untangles the impact of women's decision making power on welfare improvements (ICRW, 1997). Empirical work highlights women's predisposition to spend more resources on food and health than men (Thomas, 1990). Webb and von Braun (1994:77) for example noted that although Ethiopian female headed households (widows, divorcees, or wives of soldiers) earn less than male headed households (US\$53 versus US\$62 per person), they spend *absolutely* more on food (US\$18 versus US\$16).

The basic framework to test the two main hypotheses is the capability approach. In the capability approach, well-being achievement is an output or, equivalently, an achieved functioning. Functionings "are constitutive of a person's being" (Sen, 1992:39); they are the valued beings and doings such as nourishment, play, and self-respect. Sen (1999)

emphasises identifiable, universally valued functionings which for Kabeer (1999) are fundamental, independent of context, and no person should be excluded from having them. These basic functionings include nourishment, good health, and adequate shelter. Any difference in the achievement of these basic functionings is due to inequality and not purposeful choice Kabeer claims. Conceptually, for Sen and Kabeer, being well fed is a basic functioning—it is an end. Capability is generically defined as the space of all potentially achievable functionings. It is the positive freedom of individuals (Sen, 2008).

Capability approach theorists and practitioners often debate whether functioning or capability is the elementary foundational concept in their framework. Sen (1992, 1993) contends both are important and it depends on the type of evaluation. Sen also argues it is possible to use refined functionings or functionings enriched with capability information. In what follows, the presentation of distinct definitions for capability, functioning, and their relationship is critical for a fruitful empirical exercise. But however simple these definitions appear, they provide little guidance for operationalization. Competing, often incompatible, definitions of what capability is arise even though consensus exists on what functionings are. This controversy, it should be noted, is not specific to the capability approach. Scholars using other frameworks face similar conceptual entanglements (eg., the happiness literature). Section two further discusses these conceptual issues.

One corollary of the empirical work is the validation of a decision making power index by exploring its linkages to health functioning. The dataset used is a representative Ethiopian survey collected by the Demographic Health Surveys (DHS) in 2005. This household survey provides extensive information on household decision making processes, resources, and functionings. Furthermore, because of its multi-ethnic composition and climatic diversity, Ethiopia is a microcosm for the rest of Africa and findings may apply elsewhere (Webb and von Braun, 1994:1-2). Ethiopia also provides an institutional context with highly unequal gender norms. According to Pankhurst (2002:1), spousal relationships in Ethiopia reflect “women’s inability to play an active role in decisions that affect their position”. The World Health Organisation (1999) refers to

practices that place specific constraints on women's ability to make decisions ... these institutions exist within a broader socio-cultural context in which women's decision making abilities in general remain constrained and subjugated to the political, socio-economic, and cultural dominance of men.

Levine (1965:79) noted that even though they enjoy considerable property and inheritance rights, women among the Amhara in Ethiopia are seen as gossipers and deceivers, are often beaten, even as they work like slaves for their men. Jejeeboy (1995:7-8) argues this is a pattern which holds in most of Eastern Africa. Table 1 provides a recent snapshot of women's status. In terms of the laws, customs, and norms that constrain women's economic participation, Ethiopia performs relatively well compared to the other selected countries. However, when it comes to female genital mutilation and violence against women Ethiopia performs worst of all. In table 1 the closer the index to 1, the less empowered women are. From the selected countries, Sudan has the highest score for family code (0.8). Ethiopia has the lowest score for the family code (0.33) but the highest for female genital mutilation (0.8). With Kenya, Ethiopia is also one of the most violent against women (0.75).

Table 1. *Gender institutions in Ethiopia.*

Even though Ethiopia ranks at the bottom of the current human development scale, it performs relatively better than similar and often more developed countries in terms of women's status indicators (UNDP, 2008/9). This of course does not mean Ethiopian women carry no burdens, on the contrary.

Finally, notwithstanding Ethiopia's complex population structure, micro-climates, informal economy, and shifting geo-politics, quantitative analysis can shed light on the determinants of women's well-being. The remainder of this paper is as follows. Section two covers the main conceptual issues as well as the statistical model. The current human development achievement in Ethiopia and the position of Ethiopian women in particular,

are covered in section three. Section four introduces the data and some measurement issues. Section five discusses the estimation results and section six concludes.

II. CONCEPTUAL FRAMEWORK

A model of the capability approach

The conceptual framework adopted is consistent with Robeyns's (2005) and Kabeer's (1999) capability models. Figure 1 below captures the main theoretical components as well as the two main hypotheses to be tested as already noted in the introduction. It positions, as in Robeyns (2005), the conversion factors prior to the capability set. The figure also employs Kabeer's (1999) definition of capability as emerging from resources (the inputs) and agency (decision making). Hypothesis one is marked by (1) in the figure and it captures the impact of conversion factors on decision making power. Hypothesis two, marked by (2) in the figure, captures the impact of resources on decision making power. Hypothesis three denoted by (3) tests the direct impact of decision making power on well-being. A fourth hypothesis, marked (4), can also be tested and it involves the direct impact of resources on achieved health functionings. Finally, (5) captures the direct effect of the conversion factors on achieved health functionings.

In figure 1 the conversion factors enrich the capability set with information relevant to what individuals can achieve. There are three types of conversion factors, namely, the individual (age, sex), the social (class, ethnicity), and the environmental (urban, climate, country) (Kuklys and Robeyns, 2005). In Kabeer's definitions, resources are broadly defined to include education and individual earnings. Health in this framework is not a capability but an achieved functioning. The determinants of health functioning include individual, social, and environmental conversion factors and capability. Social norms, which affect choices, are considered a social conversion factor. Thus, capability, calibrated by the conversion factors, determines health functioning. Use will be made of the empirical literature which has identified a few determinants of well-being ranging

from individual, social, and environmental characteristics to capability and resources (Smith, 1989).

Figure 1. *The capability framework.*

The above discussion entails a nomological network as dimensions cannot be interpreted on a standalone basis. Kabeer's (1999:452) framework reflects such interdependence. Kabeer posits three dimensions, resources, agency, and achieved functionings. They are operationalized, respectively, in terms of the pre-conditions of choice, the process of choice, and achievement. In terms of figure 1, resources are the pre-conditions of choice include, decision making power is the process of choice, and health functioning the achievement. The dimensions are indivisible and necessary for measuring empowerment. In this conceptual nomological network, empowerment is to acquire the ability of making strategic life choices. Kabeer illustrates by referring to Becker (1997) who defined decision making bargaining power as an index of women's choices in three areas (purchase of outside household items, decision to work outside, and number of children to have). Becker found that take-up of pre-natal care was not correlated with contraceptive use in Zimbabwe. Since contraceptive use was relatively high and routine among women it did not require much empowerment for its use. However, pre-natal care receipt was not routine and implied intra-household decision making and assertiveness. In a similar way, Williams (2005:8) argues in Bangladesh, real empowerment obtains only where women do not adhere to prevailing gender norms.

This sub-section described a basic model that operationalises some key concepts in the capability approach. The aim of the next sub-section is to map the framework articulated in figure 1 into a statistical model.

The statistical model

Economists model bargaining power in households with resources including public resources, women share of income, unearned income, assets at marriage, and current assets among others. (Quisumbing and Maluccio, 2000:18). Subsequently, economists are

interested in capturing the impact of changes in bargaining power between partners on expenditure patterns. This paper provides a statistical model where resources and decision making power constitute the capability set and health functioning is an output (Robeyns, 2005; Strauss and Thomas, 1998:775). Simply, individual health functioning is given by $H = [C_{CF}(DMI, R); CF]$, where H is health functioning output, C capability, DMI decision making index, R resources, and CF the conversion factors calibrating the capability set and producing an independent direct effect on achieved functioning.

Since decision making power is a fuzzy concept it is most likely measured with error. MIMIC (Multiple Indicators Multiple Causes) models capture from a set of indicators measured with error an unobservable or latent variable. The observables are manifestation of the latent, error free, variable. It is likely that decision making power is an unobserved latent variable. Who actually decides in the households (has final say) is an outcome or realisation of this latent variable. Intuitively, in MIMIC, a latent variable is constructed from the correlations between the observed variables. See Kaplan (2000) for further details on MIMIC. Applications of MIMIC to the capability approach are elaborated in Krishnakumar (2007), Krishnakumar and Ballon (2008), Kuklys (2005), and Di Tommaso (2007). Williams (2005) uses the measurement part of MIMIC to capture women's empowerment in rural Bangladesh.

In figure 2, the arrows to the right of the oval labeled decision making power index represent coefficients that gauge the strength of the relationship between the index and the individual decision making variables. This decision making power index captures the commonality in four dimensions of decision making: who has final say for women's health, daily household needs, large household purchases, and family to visit. One of the measurement variables is fixed to one to identify the metric of the index. The arrows from the covariates x_i to the index are the explanatory variables of a linear regression. e [omitted from the figure] is the logistic random residual from the regression of decision making variables on the decision making index whereas ϵ [omitted from the figure] is the random residual from the single multivariate regression of the factor on the covariates. More formally, the logistic aggregate measurement model is estimated with

$$y_{ij}^* = v + \Lambda \eta_{ij} + e_{ij} \quad (1)$$

Equation (1) encapsulates four logistic equations estimated simultaneously with v (=2x4) thresholds and Λ (=3) coefficients. i identifies the indicator and j the women. Index scores η are regressed, in a second stage, on the covariates x with linear regression coefficients Γ and α intercepts such that

$$\eta_{ij} = \alpha + \Gamma x_{ij} + d_{ij} \quad (2)$$

Logistic regressions are used to calculate the decision making power index in (1) but note that equation (2) is linear. The output—health functioning—is measured using the body mass index and an anemia indicator. The x_i 's include conversion factors and resources. The former are individual characteristics such as age, household characteristics such as wealth, and institutional characteristics such as urban dwelling and gender behavioural norms. Conversion factors parameterise the capability set of individuals. For example, living in urban areas allows women enhanced availability of services, information, and mass media which expand the capability set (Abadian, 1996:1802). The resources include education and earnings. The third and final equation is the one which relates health functioning f to capability and conversion factors in β and ϕ :

$$f_{ij} = \delta + \beta x_{ij} + \phi \eta_{ij} + \mu_{ij} \quad (3)$$

All the covariates included in figure 2 are listed in table 4. However, the covariates in the decision making regression can differ from the ones in the health functioning regression, where anemia and body mass index are the dependent variables. In the health functioning regressions, women's participation in the household budget was excluded on the ground that individual earnings are potentially endogenous as health functioning feeds back into earnings (Bhargava, 1997:279-80; Dercon and Krishnan, 2000; Strauss and Thomas, 1998:803). Wealth, however, is kept in all health functioning regressions because few

women earn and among those who do, most contribute less than half of household budget. Nevertheless, a model where participation in household budget spending by wives is estimated because there is evidence health and nutrition affect the wage rate of men not women (Behrman and Deolalikar, 1989; Ferro-Luzzi et. al., 2001; Pitt et. al., 1990; Sahn and Alderman, 1988). And Strauss and Thomas (1998:795) concluded “a key virtue of these health indicators [height, BMI] is the absence of measurement error that is systematically correlated with respondent characteristics (such as income)”.

Figure 2. *Model with decision making as mediating variable.*

In principle, the basic health functioning indicators are theoretically desirable because no rational person wants to be in bad health. Nevertheless, as a caveat, it should be noted that the effect of low capability is multidimensional and it may not reveal itself as low health functioning achievement.

Comparative analysisⁱⁱ

Ethiopia is large and diverse in both geographic and population terms. It is divided in nine regional states and two city administrations. The modern urban centres in Ethiopia are Addis Ababa (center) and Dire Dawa (east). In 2004, Ethiopia’s population was still rising and approaching 80 million (from 34.2 million in 1975). Its urban population in 2005 was estimated at 16% and the share of the population under 15 was 44.5%. The urban population share was higher and the under five population proportion lower in the Least Developed Countries (LDCs) and Sub-Saharan Africa (SSA) countries in 2005 compared to Ethiopia. For the period 2000-2005 Ethiopia’s average fertility rate was 6.7 births which is also higher than the average for LDCs and SSA countries.

Only three countries among those with data have a lower average than Ethiopia’s three doctors per 100,000 people in 2000-2004. In 2005, life expectancy at birth was 51.8 years—lower than the mean for LDCs and SSA countries. Female life expectancy was 53.1 years, higher than male life expectancy male at 50.5. This favourable rate signals low country level discrimination at birth against females. Unexpectedly, Ethiopia

outperforms the drop in under-five mortality in the LDCs and SSA from 1970 to 2005. But about 10 million people still suffer from temporary food insecurity according to the OECD (2008b). The share of total undernourished population for 2002/4 was 46% and famine affected Ethiopia a new in 2008, threatening the gains made in child nutrition and health over the last decade. According to UNICEF (May 2008), 126,000 children are in need of urgent therapeutic care for severe malnutrition whereas six million children under five are impoverished, living in high risk draught areas, and in need of preventive health and nutrition interventions.

Education empowers individuals to live better and achieve goals. The Ethiopian adult literacy rate for 1995-2005 averaged 35.9% much lower than most LDCs and SSA countries. Ethiopia scores worse than the mean for the LDCs and SSA countries in the 2005 Human Development Index (HDI) with a score of 0.406 and a rank of 169 out of 177 countries. The LDCs HDI in 2005 was 0.488 while for SSA it was 0.493. Countries who perform worse than Ethiopia on the HDI are Chad, Central African Republic, Mozambique, Mali, Niger, Guinea-Bissau, Burkina Faso, and Sierra Leone. In figure 3 below it is noticeable that Ethiopia is starting from the lowest base in 1990 but it has a parallel slope to Senegal and achieves some HDI catching up after 1995.

Figure 3. *Human development trends.*

The Human Poverty Index-1 (HPI-1) is a measure of poverty. The HPI-1 value for Ethiopia is 54.9 and its rank is 105th out of the 108 developing countries for which the index is calculated. The countries below Ethiopia are Chad (108), Burkina Faso (106), and Mali (107). The difference between the HPI-1 rank and the income poverty rank is positive for Ethiopia meaning that it ranks better on the income poverty indicator than the human poverty indicator. In other words Ethiopia has more successfully reduced income poverty than human development poverty.

Gender equality

In Ethiopia highly unequal gender norms prevail (Berhane et. al., 2001; Biseswar, 2008; Legovini, 2006; Mulugeta, X; Pankhurst, 2002). While at the national level 56% of wives

in Ethiopia are not consulted in husband choice, ethnographic research reveals women's status is relatively higher in the North of the country especially among the Tigrays (Fafchamps and Quisumbing, 2005; Quisumbing and Maluccio, 2003). Ethiopia has a wider than average gender gap in school enrollments and literacy. The adult literacy ratio of female to male in 2005 was 0.46 while the gross tertiary enrolment ratio of female ratio to male in the same year was 0.32. Overall, Ethiopia's rank in the Gender Empowerment indicator (GEM) is 72nd out of 93 countries. Ethiopia here outperforms Nepal, Pakistan, Egypt, Kyrgyzstan, Ukraine, and Thailand. The Gender Development Index uses the same indicators as the HDI but captures inequalities in achievement between women and men. Its GDI score is 0.393 which is 96.8% of its HDI value. This gives Ethiopia a GDI rank of 148th out of 157 countries. Women in Ethiopia received right to vote and stand for election in 1955. The first year a woman was elected to parliament was 1957. In terms of women's representation in government, Ethiopia is below the SSA regional average. (Legovini, 2006:125).ⁱⁱⁱ Furthermore, Legovini (2006:126, 133) argues that even though harmful practices such as genital mutilation have been outlawed, the penal code has no provision to enforce them whereas judges often ignore women's rights and apply unfair informal norms.

Ethiopian rural women have challenging, multitasked, all year round work activities. These are richly described in Pankhurst (2002). According to Abate (1993:129-120)

... many observers have commented on the physical hardship that Ethiopian women experience throughout their lives. Such hardship involves carrying loads over long distances, grinding corn manually, working in the homestead, raising children, and cooking. Ethiopian women traditionally have suffered socio-cultural and economic discrimination and have had fewer opportunities than men for personal growth, education, and employment. Even the civil code affirmed woman's inferior position, and such rights as ownership of property and inheritance varied from one ethnic group to another.

The objective of this section was to contextualise the household micro-econometric that follows. The main model to be estimated is depicted in figure 1 and 2 both of which provide helpful references to the next sections.

IV. DATA AND MEASUREMENT

The data

The data set was chosen for, among other things, the potential it provides for a researcher to answer capability approach driven questions. This section describes it and runs through the measurement issues. The Demographic Health Survey (DHS) is a representative secondary data source collected in numerous developing countries including Ethiopia.^{iv} The 2005 Ethiopia DHS contains 14,500 households. 540 clusters (145 urban and 395 rural) from the enumeration areas (EA) provided in a previous Population and Housing Survey were selected. Since the male questionnaire was not submitted to all interviewed households this sample is a sub-sample of the larger data set of Ethiopian women aged 15 to 49. The weighted couple's sub-sample size has more than 2000 variables for 3236 couples. Some husbands it turned out "stay elsewhere" and their number is 10. Three of them turned out to be in polygamous relationships (a fourth case was coded as missing value for the variable staying elsewhere but was in a polygamous relationship as well). Pregnant women are deleted from the sample because they have higher body mass index. This deletion reduces the sample size to 2801 cases.

The variables are listed and the descriptive statistics reported in table 4. Some of the variables are transformed to reduce variance (age) and facilitate convergence (Muthén and Muthén, 2008). The mediating dependent variable—women's decision making power index—is measured using the four final say questions. Subsequently, I follow Alkire (2005) who distinguishes between subjective measures of human agency (confidence, happiness) and objective proxy measures (educational attainment of one parents or proportion of income over which women have spending authority).

Subjective variables

The variables that measure the decision making power index are final say type questions. Three possible answers are offered to respondents, namely, someone else has final say, shared final say, and alone final say. Table 2 shows that about 50% of Ethiopian women in relationships have final say alone for household daily needs. Legovini (2006:142) found that 67% of women in Addis Ababa and Amahara take small consumption decisions on their own. She also found that as few as 16% take their own decision for big food items and only 10% for other important items. Table 2 reports similar percentages of decisions taken alone with only 12% for own health, 10% for large household purchases, and 8% for who to visit.

Table 2. *Proportions for decision making variables.*

The remaining subjective variables include husband response to questions on husband right (right to: get angry, refuse financial support, use force for unwanted sex, have sex with other women) and husband and wife responses to questions on wife beating justification (beating justified if she goes out without telling him, if she neglects the children, if she argues with him, if she refuses to have sex with him, if she burns the food). These variables capture norms of behaviour and reflect current practices in Ethiopia (Legovini, 2006:141-143). The dimensions for husband right and beating justification are estimated outside the model using linear principal component analysis to ease computational burden.^v An index which takes the difference in answers by partners for wife beating justification is also constructed. To interpret the index, table 3 summarises the construction of the variable.

Table 3. *Difference in beating justification index.*

A statistically significant coefficient for difference in wife beating justification implies cases three and four where couples hold different views on wife beating justification. The variable is positive when wife states beating justified but husband states beating not justified and negative when wife states beating not justified and husband states beating justified. A positive coefficient in the regression with decision making power as the

dependent variable thus implies that in relationships where wives say beating norms are justified and husbands not, women have more decision making power. However, wives who disagree with the beating norms in relationships with husbands who think beating is justified, achieve lower decision making.

Objective variables

The objective variables at the individual level are wife age and years of formal education. At the household level wife proportion of household expenditure, age difference between partners, household wealth, and whether husband is in a polygamous relationship. In Ethiopia it is common that locally educated men marry less educated women with whom they expect an authoritarian relationship (Levine, 1965:209). But difference in years of education between partners resulted in convergence problems. It was accordingly excluded on the grounds that it caused multicollinearity with wife education as few households had any. Finally, at the institutional level, urban, time to water source, religion, and regional dummies were included.

Table 4. *Descriptive statistics.*

Indicators of health functioning

The dependent variables are women's health functionings measured by BMI and anemia. According to Abate (1993:152), approximately 7% of all hospital death in Ethiopia are related to malnutrition and anemia. Malnutrition is a chronic problem in some regions of Ethiopia where famine spells haunt present and future (Webb and von Braun, 1994). The mean BMI for this sample is 20.21 which is less than the mean for Sub-Saharan Africa at 21.2 in 1957-1994 (Pelletier and Rahn, 1998). The BMI is a sex and age independent current nutrition indicator equal to weight (in kilograms) divided by the square of height (in meters). The BMI captures current nutritional status and is negatively correlated with illness and higher mortality rates (Dasgupta, 1993:414-5; Fogel, 1994; Scrimshaw, 1996). The index is also an indicator of energy levels stored in the body (Dercon and Krishnan, 2000). James (1994) concludes there is now strong evidence low BMI implies more sickness, lower activity capacity, limited social activity, and lower income. The WHO considers individuals a BMI value under 18.5 as underweight. But to Shetty et. al. (1994)

this is not necessary and individuals with BMI<18.5 may not be chronically energy deficient. Shetty et. al. (1994) argue instead a cut off of 17 is more appropriate. Dasgupta contends the BMI range 15–18.5 is an indication that the person is at risk. Furthermore, in population with low body fat stores, additional weight loss leads to loss of lean tissue such as muscles and internal organs (Ferro-Luzzi et. al., 2001). A healthy BMI spans the 18.5–25 range. Above 25, the BMI signals overweight. Since a BMI score above 25 does not contribute to well-being and may be harmful, its logarithm is used.

Empirical research reveals BMI changes with age yet there is no a priori expected direction of change. However, in both poor developing and developed countries, BMI tends to fluctuate with seasons (Ferro-Luzzi, Branca, and Pastore, 1994). This fluctuation is especially strong in rural areas of developing countries. Rural farmers may maximise their energy availability for the harvest season and experience lower BMI in the lean pre-harvest season. It is reported that in some seasons adults can lose up to 10% of their body weight (Dercon and Krisnan, 2000; Dasgupta, 1993:417). According to Ferro-Luzzi et. al. (2001), seasonal energy stress in Ethiopia occurs even in normal harvest years and affects more men than women. In rural Ethiopia, unlike Gambia, men undertake the most energy demanding jobs. James (1994) notes women with the lowest BMI in fact have the least fall in weight with seasonal shortages. Women (and children) work at moderate rates but all year long doing low intensity, often post-harvest, livestock, and other nonfarm activities. Ferro-Luzzi et. al. also posit that in rural areas the energy needs of adults are often not met to reduce children's seasonal nutritional fluctuations. Since this DHS survey was conducted between April 27 and August 30 2005, rural individuals which constitute about three quarter of the sample, were in the post harvest season as harvest is done around October-January (USDA, 2006).^{vi} Nevertheless, according to the World Food Programme, 2004 and 2005 were good harvest years that produced surplus and the last draught occurred in 2002/03 (WFP, 2005). Be that as it may, it is hard to predict in advance the direction and extent to which the seasonal bias has affected the results.

In the 2005 Ethiopia DHS the anemia indicator is a categorical variable with four categories: severe, moderate, mild, and not anemic. It is estimated that more than 30% of

Ethiopian population is anemic (Rispin, 1998). Anemia is caused by insufficient iron intake and reflected in the amount of oxygen in the blood. According to the University of Maryland Medical Center (accessed 30/08/2008),

even mild anemia can reduce oxygen transport in the blood, causing fatigue and a diminished physical capacity. Moderate to severe iron-deficiency anemia is known to reduce endurance. Some studies indicate that even iron deficiency without anemia can produce a subtle but still lower capacity for exercise.

Over the long term, anemia leads to secondary organ dysfunction, damage, and heart failure. Anemia increases the chances for poor pregnancy outcomes and affects cognitive and motor of children and adolescents as well as mortality rates among the elderly (Farah, Noble, and Hurt, 2005; University of Maryland Medical Center, 2008).

The nutrition data shows the following patterns. Out of 2771 cases, 24% or 665 are considered at risk with a BMI under 18.5. In Kenya and Ghana these rate are lower at 6.4% and 16.4% respectively (Garcia and Kennedy, 1994). For anemia, about 28% of the sample, or 725 out of 2595 cases, suffer from mild to severe anemia.

Exploratory data analysis

In table 5 the regional distribution and shortfalls from the means of BMI and anemia are listed. The table highlights that for BMI most regions are slightly under the means where as a few regions (eg., Addis Ababa) are significantly above the mean. The standard deviation of BMI mean differences is eight times larger than the ones for anemia (1.17 and 0.15). Dercon and Krishnan (2000:694) estimate for rural areas over the period 1994/5 the north (N) has the highest mean BMI. The current data suggest a different mapping where the north of the country has negative deviation from the mean. The DHS is also more recent and representative of the entire Ethiopian population where the centre (C) of the country enjoys the largest positive mean BMI deviations.

Table 5. *Regional health functioning indicators.*

As expected, (table 6) urban women have better health functionings than rural women and the differences are statistically significant. This should not come as a surprise when 70% of all Ethiopians live more than three days' walk from a health centre (Abate, 1993:153; see also Berhane et. al., 2001:1526). Table 6 also shows that the poorest fifth have statistically significant lower mean BMI and anemia scores compared to the richest fifth.

Table 6. *Residence, wealth, proportion of household expenditure, and health functioning.*

Table 7 compares means of health and decision making scores for groups with some educational attainments against no education. According to Furuta and Salway (2006) education improves women well-being because it is linked to more use of health care as well as spousal discussion of family planning leading to an increased likelihood of receiving antenatal and delivery care. The effect of education, they argue, operates in part via increased discussion between couples so that women are able to influence decision making without challenging gender and age hierarchies.

Table 7. *Education and health functioning.*

Women with no education have lower BMIs and anemia scores. The differences are statistically significant at the 5% level. Furthermore, except for decisions concerning family visits, educated women take significantly more decisions in all dimensions. In table 8 the hypothesis whether women who take more decisions have better health and nutrition is explored. In southern rural Ethiopia the majority of married women (89.3%) require permission of husband to visit a health facility (Berhane et. al., 2001:1534). The results in table 8 show that for BMI the category someone else takes the decision has the lowest health scores compared to the other two categories. However, women for whom someone else takes health, large household purchases, and visits final decisions achieve better anemia scores than women who take these decisions alone. For anemia the highest levels of good health are attained by women who share decisions and only women who take decisions alone for daily needs have the highest mean score. These preliminary results suggest that anemia and BMI interact differently with decision making in the

household. The multivariate regressions to be estimated will confirm whether this hypothesis is correct.

Table 8. *Decision making power variables and health functioning.*

As Berhane et. al. (2001:1531) report, husbands in southern rural Ethiopia may not encourage women to use health care centres and often refuse to give any money. It is possible to explore husband's attitude and its relationship to women's health (table 9). Statistically significant differences in means obtain for BMI and husband right to refuse financial support, and for anemia with husband right to force sex and have sex with other women. These simple bivariate relationships show that there may be an association between husband's belief (and actions) and wife health. Indeed, women engaged to men who think husbands have the right to withdraw financial support have lower BMI scores. Presumably, women in such households are in a vulnerable position of dependence. Men can use their power and actualise their threats by withdrawing support and undermining women's health.

Table 9. *Husband rights reported by husband and health functioning.*

Polygamy in Ethiopia is not restricted to Muslim groups (Levine, 1965; Pankhurst, 2002:119-20), it has negative physical and psychological effect on women (Kabira et. al., 1997:31), and it undermines the bargaining power of women among coffee growers (Lim et. al., 2007). To test if this hypothesis is reflected in the DHS data as well, the functioning and decision making means for polygamous and non-polygamous women are estimated in table 10. For final say in health, large household purchases, and visits the differences are significant and in the expected direction.

Table 10. *Polygamy and functioning decision making means.*

Fasting for both Muslims and Christians can affect BMI and anemia. Fasting for Christians in Ethiopia is considered important and expected about 165 days a year (Abate, 1993:134-135; Levine, 1965). Fasting Christians avoid the consumption of food from animals. For Muslims fasting occurs in the month of Ramadan. The interviews were

conducted between April 27 and August 30 2005, a period outside the yearly fasting calendars. However, while Christians have higher mean anemia scores there is almost no difference between mean BMI scores.

Table 11. *Mean differences in health functioning indicators.*

IV. ESTIMATION

Method

A maximum likelihood robust (MLR) estimator is used to estimate the model in figure 1 and 2. The MLR is the standard structural equations estimator. The results in this section gauge the association of conversion factors and capability on health functioning. Accordingly, the proportion of variance explained is of no interest per se. It should also be noted, that the measurement decision making power index is identified after the model explanatory covariates are added. Capability and functioning must be measured, and their relationships estimated, together. Failing to do so undermines the nomological nature of the model and could bias model parameters (Bentler, 2006:34-35, 39).

Table 12 and 13 report the standardised results of the body mass index and anemia regressions. The total number of missing cases is 458. About half these cases (206) are missing because of the dependent variable anemia. Difference in wife beating justification also has some missing cases (189). The tables provide two standard errors, one of which corrects for regional clustering and will be the primary reference.

The measurement model

The upper panels of tables 12 and 13 contain the measurement model for the decision making power index. All the index coefficients are positive and statistically significant. The coefficients can be interpreted in terms of an odds ratio. For this, the unstandardised coefficients are used. The unstandardised coefficient for large household purchases is 0.91 and the odds for sharing the decisions over someone else taking the decision, when the decision making index increases by a unit, is 2.5 times higher ($\exp^{0.91}$). The fact that

all coefficients are positive and statistically significant means they are positively correlated. Note that while the health decision making variable is still fixed to one, standardisation allows us to see its actual weight.

Decision making regressions

In the second panel from the top, the regression for decision making is reported. In terms of figure 1 this part of the table encloses the hypotheses marked (1) and (2). This panel is divided into three sub-sections where variables at the individual, household, and institutional level are respectively listed. At the individual level only the covariate for age (0.10) is statistically significant. For a standard deviation increase in (the logarithm of) age, the decision making power index increases by 0.10 standard deviations. This may corroborate Berhane et. al. finding (2001:1534) that older women in rural southern Ethiopia are more independent in taking health and selling crops decisions. Unexpectedly, there appears not be a relationship between education and the decision making power index. A dummy for any years of education was also tested but it turned out not statistically significant as well. This undermines hypothesis (2) in figure 2 because education, a resource, has no influence on decision making power. Subsequently, in the bottom panel, the direct relationship between education and health functioning is considered.

At the household level, the conversion factors age difference (0.08), difference in wife beating justification (0.16), and polygamy (-0.08) are statistically significant. Williams (2005:20) found in rural Bangladesh that women who conform to modesty norms have more household decision making power than women who do not conform to modesty norms. Household wealth dummy codes 0 the poorest quintile. There is no evidence that women in poorer Ethiopian households take less decision as reported elsewhere (Dercon, 1999:25-7). However, wife contribution to household budget more than half is positive (0.08) and statistically significant at the 5% for the uncorrected standard errors (at 10% for the corrected standard errors). This supports hypothesis (2) in figure 1 which posited a relationship between a resource and decision making power. Similarly, Legovini (2006)

contended women's own income enhances independent decision making in households from Addis Ababa and Amhara.

At the institutional level, the conversion factors urban (0.12) and both gender norms institutional indices, husband rights reported by husband (-0.04) and wife beating reported by wife (-0.25) are statistically significant. Legovini (2006:141-2) argues that although urban Ethiopian women are more empowered than rural women, paradoxically, they are more often beaten. The above results imply women in relationships with men who claim women have few rights achieve lower scores on the decision making power index. The beating justification factor reported by the wife has a coefficient which is five times larger than the husband rights factor. Although being Christian is positive (0.07), it is only marginally statistically significant. While religion is more important for Ethiopian women than men (Biseswar, 2008:142), this ambiguous coefficient may be due to the fact that all religious and ethnic groups repress women in Ethiopia. For example, both Christians and Muslim practice female genital mutilation (WHO, 1999). Pankhurst (2002:2) reports that the dominant Orthodox Christian group empower men not women; furthermore, Christians are often less liberal than Ethiopian Muslim women who according to Legovini (2006:133-135, 141) marry later^{vii} and are more aware of their gender political engagement (eg., knowledge of female representation in kebele and woreda "political" councils). The dummy coefficients are relative to the region Oromay and all except Amhara are statistically significant. Compared to Oromay, women in Tigray, Somali, Ben-Gmuz, SSNP, and Gambela achieve lower scores on the decision making power index, *ceteris paribus*. Thus, women from the North of Ethiopia do not necessarily take more decision in the household. The behavioural significance of these dummies is possibly related to the importance of ethnicity in Ethiopia (Levine, 1965; Quisumbing and Maluccio, 2000).

BMI regression

The BMI regression tests hypotheses (3), (4), and (5) in figure 1. In the third and final panel of table 12 the results are reported. Ferro-Luzzi et. al. (2001) explain BMI seasonal changes in southern Ethiopia with age, sex, education, per capita land area, value of life

stock, household dependency ratio (old and young to working age), and location of residence. Here slightly more than a tenth of the variance in BMI is accounted for by the covariates. The many factors that affect BMI and anemia explain the low r-squares. These include individual activity levels not included among the explanatory variables. Furthermore, according to Liere et. al. (1994) the determinants of body weights fluctuation in Benin are a function of sanitation and health not socio economic status. Nevertheless, at the individual level, education (0.10) is statistically significant. A 10% rise in years of schooling raises BMI by 10% thus supporting hypothesis (4). Ferro-Luzzi et. al.'s (2001) have earlier also argued education in Ethiopia protects against seasonal (not chronic) malnutrition. At the household level, one of the capability component, the decision making power index (0.1), is statistically significant supporting hypothesis (3). Therefore, controlling for the other covariates, women who take more decisions at home have higher BMI scores. This is counterevidence for the finding by Furr and Das (2006) in Nepal that decision-making autonomy.^{viii} Decision making power and education both of which are capability components have, independently, a positive statistically significant relationship with health functioning. The polygamy dummy (-0.02) is also statistically significant. For wealth, the results are consistent with Ferro-Luzzi et. al. (2001) who found adult seasonal BMI uncorrelated with wealth in southern Ethiopia. Kennedy and Garcia (1994) also report BMI scores of women are negatively, whereas men's are positively, correlated with household income in Gambia and Kenya. They explain this unexpected result by showing that women in Kenya spend twice as much effort in home production compared to women in the Philippines who also have better access to services such as water collection. Kennedy and Garcia (X) furthermore cite literature arguing that the strongest predictor of work capacity is long term nutritional status as measured by height not BMI which captures short term nutritional status.

Excluding the dummies, at the institutional level, only urban (0.19) is statistically significant. Distance from water (-0.05) is statistically significant at the 10% level. For every 5% decrease in the time needed to collect water, *ceteris paribus*, BMI increases by 5%. Tigray (-0.08), Afar (-0.02), Amahra (-0.07), SSNP (-0.01), Ben Gumuz (-0.04), SSNP (-0.06), Gambela (-0.02), Harari (-0.01), and Dire Dawa (-0.01) are statistically

significant compared to the reference region. The pattern of negative dummies closely follows the famine belts in the north-east and south of the country mapped by Webb and van Braun (1994:21-23). The latter give three mutually reinforcing causes for the vulnerability of these regions, namely, population pressure, agro-ecological resource base, and climatic regime.

Anemia regression

The first two panels of the anemia regression are similar (yet not identical) to the ones for BMI. The lack of symmetry between table 12 and 13 is in part explained by the nomological network. In particular, the third quadrants are different because the dependent variables are not the same. In fact, the anemia regression has a lower r-square.

Analysing the anemia ordered logistic regression panel in table 13, the individual covariates age and education are not statistically significant. At the household level, age difference (0.08) and the richest group (0.13) are statistically significant. The wealth-anemia relationship could corroborate Dercon's (1999:35) finding that the poorest find cost of treatment at hospitals and health centres too high. However, it may also be related to meat eating which helps the body absorb iron which only the richest can afford (Rispi, 1998). Decision making in the household as defined has no effect on anemia. But this does not mean it has no effect at all. As noted in table 8 the highest level of anemia for women who share decisions not those who take them alone. This result undermines hypothesis (3), namely the decision making power has an effect on health functioning. At the institutional level, time to water (0.04) is statistically significant. The index for wife beating justification reported by wife (-0.09) is statistically significant at the 7% level (for un-adjusted standard errors).

These results provide a considerable information (i) concerning which regions in Ethiopia, after controlling for other factors, have the largest shortfalls in health functionings; (ii) which covariates at the individual, household, and institutional level have the strongest relationships with health functioning; (iii) and which of the capability components have a relationship with health functioning. If the assumptions behind the

capability model and conversion factors are credible, compared to anemia health functioning, variations in BMI across Ethiopian women are easier to explain. The next sub-sections consider sensitivity analysis and some extensions.

Table 12. *Decision making power index and BMI regressions.*

Table 13. *Decision making power index and anemia regressions.*

Sensitivity checks

For more precise estimates a sensitivity analysis is attempted using censored dependent health functioning variables. For BMI (see Furr and Das, 2006), the literature reviewed earlier in section three established BMI scores under or equal to 18.5 as the risk range. Accordingly, women with BMI scores under 18.5 are coded one and all others zero. Similarly, for anemia, all scores below or equal to three (mildly anemia) are coded one (others zero). Exactly the same covariates are included as before. With these transformations, the results now reflect which covariates differentiate sick and malnourished women from others. A corollary outcome will also be to compare the extent to which these new results are consistent with the earlier ones.

For space purposes the results are not reported. The sign of the coefficients now reverse because the dependent variables measure the probability of ill-being. The estimates for the health functioning regressions are considered because the decision making regression is unchanged. Instead of a linear regression a binary logistic regression is now estimated for BMI. The education covariate has a negative statistically significant coefficient (-0.05). Thus, for each percentage point increase in years of education, the probability of a BMI under 18.5 falls by -0.05 logit units (odds ratio 0.87). Age (0.07) is also now statistically significant (for the unadjusted standard errors).^{ix} At the household level, wealth is a significant variable—the richest group has a negative statistically significant sign (-0.09). The decision making power index is no longer statistically significant but maintains the expected sign. Accordingly, decision making power does not “explain” why some women have a BMI below 18.5. It is possible, however, that decision making power explains BMI levels above 18.5. Under this threshold, women’s decision making power seems not to influence the distribution of resources in her favour. Indeed,

additional estimates reveal that the decision making power index has a strong positive relationship with BMI scores above 20. One possible explanation is that women with a BMI under 18.5 and high decision making power divert resources (such as, nutrition) to feed children (Ferro Luzzi et. al., 2001:49). Only after the household is well fed, women use their bargaining power to improve their nutrient intake. At the institutional level, urban (-0.12) loses some of its significance level (now at 7.2% and 3.2%, respectively, for adjusted and un-adjusted standard errors). For the binary anemia regression, the results are not much changed. Only age difference (-0.08) is now statistically significant, while the richest group (-0.1) is only marginally statistically significant. At the institutional level for anemia, water (-0.03) and some regional dummies are statistically significant. This robustness check therefore qualifies some of the earlier results. Next some extensions are considered.

Extensions: wife contribution to household budget

Research conducted in rural area south of Addis Ababa by Ferro-Luzzi et. al. (2001:29-36) found that a low BMI for women (not men) is uncorrelated with maximal oxygen consumption. The latter is a fundamental work capacity and productivity indicator. Generalising this hypothesis may weaken the feedback loop from health functioning to work and wife individual incomes. The model in figure 2 is therefore re-estimated adding wife household budget share to explain BMI and anemia scores. Since the other coefficients are unchanged, the full results are not reported for space purposes. While larger wife contributions to household budgets do not improve anemia scores, the impact on BMI is statistically significant but none-linear. Again this seems to reinforce the earlier conclusion that capability has no impact on the anemia health functioning. For BMI, women who contribute nothing, compared to women contributing less than half, have higher BMI scores (0.026). Women, however, who contribute more than half of the budget have a lower BMI score (-0.028). Is it possible that women contributing the most to household budgets are predominantly poor and working for survival? Fafchamps and Quisumbing (2005) argue women who work for a wage in Ethiopia are poor themselves and usually from poorer backgrounds. But this hypothesis cannot be sustained since the highest contributions to budgets occur in the wealthiest households (4.2) according to the

DHS. Still, the group of women providing less than half is richer (3.6) than the one which provides about half (3.3). Three alternative explanatory hypotheses are considered here. The first hypothesis follows from reports in Kenya that women from the poorest households experienced the least weight fluctuations because of their low overall weight and food intakes whereas women from wealthier groups depended on farming and experienced the most fluctuations (Liere et. al., 1994:480). In fact, the data shows that women active in the agriculture sector have a BMI score lower than the mean and an anemia score higher than the mean. A second possibility is that women who contribute the most to household budgets also expend the most in terms of energy which results in an overall lower BMI score (James, 1994). The third untested possibility is that wealthy husbands cut their financial flows to wives that rely exclusively on their earning to sustain themselves and other dependent members of the household. Given the few numbers of working women in this data set these hypotheses are difficult to test.

Interactions

To explore the impact of interactions, different specifications are added to the health functionings regressions. This is done in two stages. All interactions are estimated simultaneously with the other covariates first. Subsequently, each interaction is estimated alone with the other covariates. Results are reported in table 14 and 15. Decision making power was interacted with age, education, household budget contributions, difference in wife beating justification, and polygamy. An additional interaction with age and urban is added to test Giay and Khoi (1994) hypothesis that the impact of age differs in rural and urban areas. For the decision making interaction, a dummy was used coding women with scores below the average on decision making one (other wise zero).

For anemia the decision making power index is now negative and statistically significant whenever the *age x decision making* variable is included. The interaction, however, *age x decision making* is not statistically significant. The education interaction (0.04) is statistically significant when all the interactions are estimated simultaneously (but only at the 10% level when estimated alone). Thus, years of formal education interact positively with low decision making power, raising women's anemia scores and providing support

for hypotheses (2) and (3). The interaction of low decision making power with more than half budget share is statistically significant and negative (-0.036). The latter households are cases where women contribute more to household budgets than men, the traditional provider in Ethiopia, and yet take fewer decisions, achieving in the end lower health functioning compared to others. This again provides support for the importance of hypotheses (2) and (3). One possible explanation is that some form of punishment by men is taking place.^x The explanation of punishment is more credible than neglect because these women take fewer decisions than the average which should not be the case if the men decides to neglect his duties. Finally, the *age x urban* interaction (-0.14) is statistically significant. Thus, while living in an urban area improves anemia scores (0.2), ageing for women in urban areas worsens them.

Exactly the opposite result obtains for BMI where ageing in urban areas raises BMI (0.33)—supporting somewhat Giay and Khoi (1994) hypothesis. The urban dummy, however, is no longer significant and its sign reverses (-0.14). In the BMI regressions, the decision making interaction with education (0.04) is also statistically significant. Furthermore, the interaction term for difference in husband and wife beating justification (-0.05) is statistically significant. A negative sign for this interaction implies that low decision making power in the household interacts negatively with divergent points of view over wife beating justification. Thus, in households where someone else takes most decisions and wife states beating not justified whereas husband states beating justified, women achieve lower BMI scores.

Table 14. *Interactions BMI.*

Table 15. *Interactions anemia.*

VI. CONCLUSION

This paper employs a MIMIC model to identify which conversion factors and capability information are related to women health functioning in Ethiopian households. The results emphasise the importance of tailoring well-being interventions. More specifically, the results indicate in Ethiopia wives who take more decisions in household are not always better off, confirming what others have argued in the empowerment literature. For instance, when anemia health functioning is regressed on decision making power in both the principal and interacted regressions, a negative (but not always statistically significant) coefficient was obtained. This raises doubts the possibility of a positive relationship between decision making and health achievement as suggested by hypothesis (3). Nevertheless, it was also established, years of formal education interacted with decision making revealed education improves anemia scores for women with low decision making power. This is a substantive finding given the definition of capability as emerging from the combination of decision making power and resources. Furthermore, women in wealthier households in which a smaller age gap between husband and wife obtains had better anemia health functioning, reinforcing hypothesis (5) of a direct relationship between household conversion factors and health functionings. Still, decision making power in households matters for women's well-being. Controlling for individual, household, and institutional characteristics, women who take more decisions achieved higher body mass index scores. Decision making power, however, does not help distinguish women with BMI under 18.5 from others. The positive impact of decision making power seems to operate for those with a BMI above 20. Various hypotheses why this may be so were explored. Finally, both disagreement with husband on norms of wife beating and a high household budget share interacted negatively with decision making, further reducing BMI and anemia scores respectively.

Ethiopia is a diverse country—a microcosm for the rest of Africa. Any statistical finding at the national level is most likely to break down at the local level. Accordingly, further research, possibly of the qualitative sort, is needed to assess more specifically under which conditions women's decision making scope in the household improves well-being.

These results however confirm an intuitive idea, namely, that decision making has a none-linear relationship with health functioning. As noted in table 8, women sharing decisions with their husbands achieve better anemia scores everything else equal. Had the index taken shared decision as the maximal point an alternative conclusion would be that decision making of the cooperative sort matters more for anemia health functioning. Thus, one way to help raise Ethiopian women's BMI above 20 is to boost their decision making power absolutely, whereas to raise their anemia scores it may help to facilitate communication and cooperation with the husband.

To conclude, in Ethiopia, there is less overt discrimination against women than Asia. But Ethiopian women still live in one of the most violent societies against them. The results above confirm that husbands beliefs matters for how much decision making a women has. As in the Asian context, attempting to sensitise husbands' beliefs is also likely to improve women's position (Kamal, 2000). But paradoxically it is women who sustain and perpetuate harmful practices and traditions such as genital mutilation in Ethiopia (Pankhurst, 1992). Women chores, furthermore, reflect a degrading image connected to demeaning activities (such as dung management in rural areas), "impure" biological experiences (such as menstruation and birth), and heterodox practices such as beliefs in spirits and sorcery. As contradictory as it sounds, it is, at the same time, women's activities that define the community and its roots. Since top down gender organisations were never interested in effectively empowering women, they failed to make marked improvement. Peasants are in fact "likely to resist the efforts of some unknown official from Addis Ababa to introduce change in their local environment" (Levine, 1965:88). To introduce change, to empower women, institutionally supported grass roots initiatives should be nurtured. The aim is to spark a self-sustaining societal debate that reflects on and transmits the authentic value of women's efforts and experiences. This requires both bottom-up community empowerment and top-down programming approaches (Laverack and Labonte, 2000). The above findings therefore need further scrutiny through enrichment with local information and outside agency operations. Ferro-Luzzi et. al. (2001) recommend in light of this the usage of community based organisations and

universally targeted schemes (which could involve food or cash for work, see Webb and von Braun, 1994) for the fight against under-nutrition and ill health in Ethiopia.

TABLES AND GRAPHS

Table 1. *Gender institutions in Ethiopia.*^{xi}

	SOCIAL INSTITUTIONS								
	Family Code	Female Genital Mutilation	Violence against women	Missing Women	Freedom of movement	Obligation to wear a veil in public	Women's access to land	Women's access to bank loans	Women's access to property
Ethiopia	0.33	0.8	0.75	0.16	0	0	0.7	0.5	0.5
Kenya	0.44	0.38	0.17	0.22	0	0	0.7	0.7	0.7
CAR	0.66	0.43	0.75	0.05	0	0	1	0	0.4
Sudan	0.8	0.89	0.75	0.27	0.7	1	1	1	1
Senegal	0.7	0.2	0.25	0	0	0	0.5	0.5	0.5

Source: OECD Gender, Institutions and Development Data Base.

Figure 1. *The capability framework.*

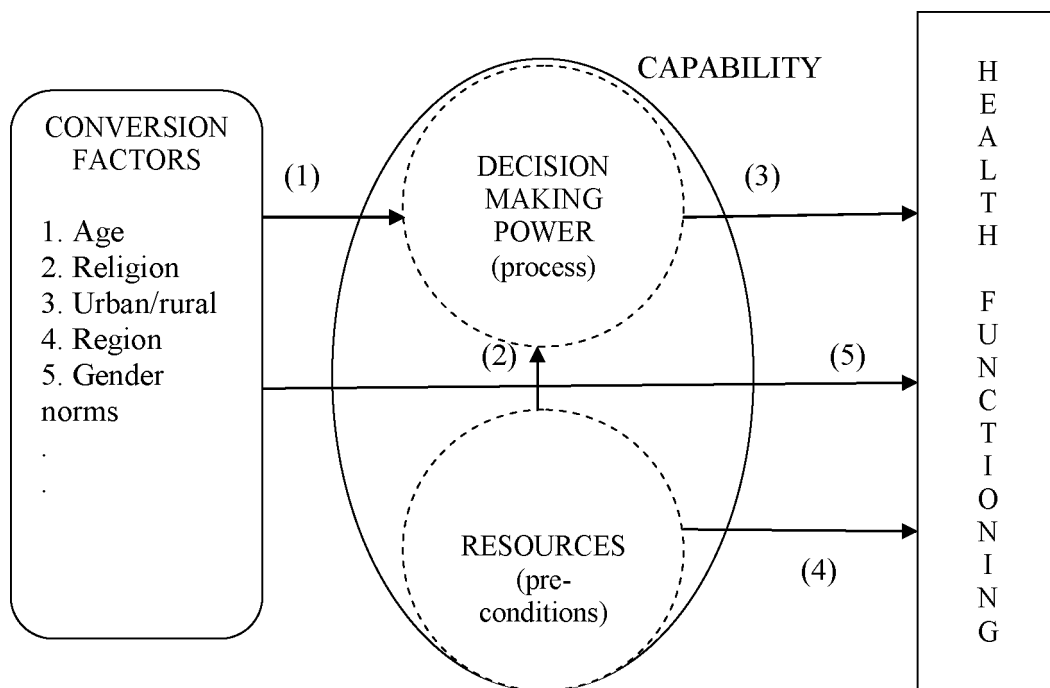


Figure 2. *Model with decision making as mediating variable.*

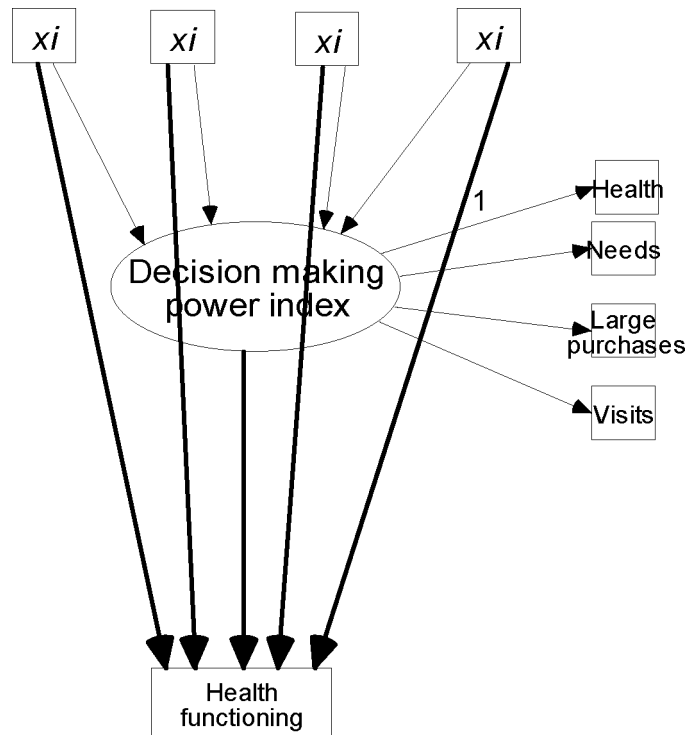
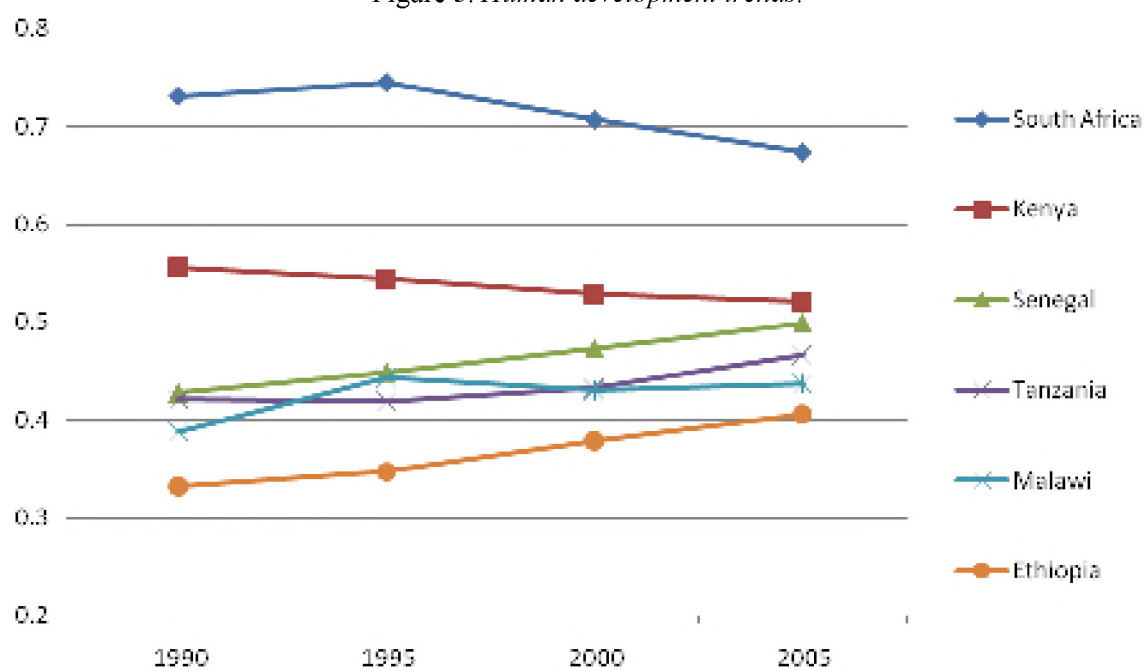


Figure 3. *Human development trends.*



Source: UNDP (2008)

Table 2. Proportions for decision making variables.

	Wife final say health		Wife final say large household purchases		Wife final say household daily needs		Wife final say visits to family and relatives	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Someone else	983	35	1254	45	434	15	541	19
Shared	1481	53	1267	45	965	34	2039	73
Alone	336	12	280	10	1401	50	220	8
Total	2800	100	2800	100	2799	100	2800	100

Source: Demographic Health Surveys Ethiopia 2005.

Notes: In italic-bold maximal values.

Table 3. Difference in beating justification index.

	Wife score	Husband score	Difference (wbj – hbj)
Case 1	(+)wbj	(+)hbj	Ambiguous (≈ 0): wife and husband state beating justified
Case 2	(-)wbj	(-)hbj	Ambiguous (≈ 0): wife and husband state beating not justified
Case 3	(+)wbj	(-)hbj	Positive: wife states beating justified, husband states beating not justified
Case 4	(-)wbj	(+)hbj	Negative: wife states beating not justified and husband states beating justified

Table 4. Descriptive statistics.

	N	Mean	Median	Std. Deviation	Min	Max	Skewness	Kurtosis	Descriptive
Age	2801	30.33	29	8.4	15	49	0.36	-0.78	Years
Education	2801	1.05	0	2.58	0	18	3.05	9.76	Years of formal schooling
Proportion of household expenditure	2801	0.13	0	0.47	0	3	4.38	20.73	0=none; 1=less than half; 2=half; 3=more than half
Wealth	2801	2.98	3	1.37	1	5	0.03	-1.23	Household assets and utility services
Difference in wife beating justification	2612	0.14	0.27	1.29	-3.61	1.96	-0.41	-0.42	wbj – hbj
Urban	2801	0.09	0	0.29	0	1	2.86	6.19	1=urban; 0=rural
Water (distance)	2783	37.60	20	47.00	0	480	3.14	13.84	Minutes
Religion	2801	0.67	1	0.47	0	1	-0.72	-1.49	1=Christian; 0=Other
Number of wives (polygamy)	2801	1.07	1	0.31	1	7	5.04	31.22	1,...,7
Index husband rights (husband)	2671	0.01	-0.56	0.99	-0.56	3.9	1.95	3.34	1=yes; 0=no
Index wife beating justification (husband)	2674	0.04	-0.32	1	-0.83	2.01	0.79	-0.82	1=yes; 0=no
Index wife beating justification (wife)	2738	0.14	0.55	0.97	-1.6	1.13	-0.62	-0.99	1=yes; 0=no
Wife final say health	2800	1.77	2	0.65	1	3	0.26	-0.71	1=someone else; 2=shared; 3 alone
Wife final say large household purchases	2800	1.65	2	0.65	1	3	0.5	-0.71	1=someone else; 2=shared; 3 alone
Wife final say household daily needs	2799	2.35	3	0.73	1	3	-0.64	-0.89	1=someone else; 2=shared; 3 alone
Wife final say visits to family and relatives	2800	1.89	2	0.51	1	3	-0.18	0.59	1=someone else; 2=shared; 3 alone

Anemia	2595	3.62	4	0.68	1	4	-1.75	2.34	1=severe; 2=moderate; 3=mild; 4=not anemic
Body mass index	2771	20.21	19.95	2.64	13.37	52.91	2.31	16.6	18.5< undemourished

Source: Demographic Health Surveys Ethiopia 2005.

Table 5. Regional health functioning indicators.

	Body mass index	Anemia	Mean difference Body mass index	Mean difference Anemia
Tigray (N)	18.86	3.60	-0.82	0.00
Afar (N)	19.53	3.38	-0.15	-0.22
Amhara (N)	19.52	3.57	-0.16	-0.03
Oromya (S)	19.82	3.59	0.14	-0.01
Somali (SE)	19.54	3.37	-0.14	-0.23
Ben-Gmuz (NW)	18.73	3.50	-0.95	-0.10
SNNP (S)	19.63	3.68	-0.05	0.08
Gambela (W)	19.14	3.41	-0.54	-0.19
Harari (CE)	20.24	3.65	0.56	0.05
Addis Ababa (C)	22.95	3.85	3.27	0.25
Dire Dawa (CE)	20.38	3.58	0.70	-0.02
Overall mean	19.68	3.60	0.17	-0.04

Notes: C center, E east, W west, N north, S south.

Source: Demographic Health Surveys Ethiopia 2005.

Table 6. Residence, wealth, proportion of household expenditure, and health functioning.

	Urban	Rural	Poorest 20%	Richest 20%
Body mass index	22.57	19.97	19.88	21.25
Anemia	3.82	3.6	3.5	3.8

Source: Demographic Health Surveys Ethiopia 2005.

Table 7. Education and health functioning.

	Education	
	Yes	No
Anemia	3.72	3.59
Body mass index	20.99	19.98
Wife final say health	1.84	1.75
Wife final say large household purchases	1.78	1.62
Wife final say household daily needs	2.46	2.31
Wife final say visits to family and relatives	1.91	1.88

Source: Demographic Health Surveys Ethiopia 2005.

Table 8. *Decision making power variables and health functioning.*

	Body mass index				Anemia			
	Health	Large household purchases	Daily needs	Visits	Health	Large household purchases	Daily needs	Visits
Someone else	19.89	19.87	19.76	19.84	3.59	3.61	3.57	3.58
Shared	20.34	20.41	20.12	20.28	3.66	3.64	3.61	3.64
Alone	20.53	20.72	20.4	20.38	3.51	3.57	3.64	3.52

Source: Demographic Health Surveys Ethiopia 2005.

Notes: Maximal values highlighted in italic bold.

Table 9. *Husband rights reported by husband and health functioning.*

	Body mass index		Anemia	
	Yes	No	Yes	No
Husband right to: get angry	20.15	20.24	3.61	3.63
Husband right to: refuse financial support	19.97	20.24	3.62	3.62
Husband right to: use force for unwanted sex	20.14	20.21	3.54	3.63
Husband right to: have sex with other women	20.21	20.21	3.72	3.62

Source: Demographic Health Surveys Ethiopia 2005.

Table 10. *Polygamy and functioning decision making means.*

	Polygamy	Mean
Anemia	Yes	3.62
	No	3.62
Body mass index	Yes	19.96
	No	20.22
Wife final say health	Yes	1.58
	No	1.78
Wife final say large household purchases	Yes	1.53
	No	1.66
Wife final say household daily needs	Yes	2.36
	No	2.34
Wife final say visits to family and relatives	Yes	1.72
	No	1.90

Source: Demographic Health Surveys Ethiopia 2005.

Table 11. *Mean differences in health functioning indicators.*

	Christian	Mean
Anemia	No	3.55
	Yes	3.65
BMI	No	20.20
	Yes	20.21

Source: Demographic Health Surveys Ethiopia 2005.

Table 12. *Decision making power index and BMI regressions.*

ORDERED LOGISTIC: Decision making index				
	Coefficients	Standard errors (clustering)	p-value (clustering)	p-value (no clustering)
Wife final say health	0.62	0.05	0.0	0.0
Wife final say large household purchases	0.58	0.05	0.0	0.0
Wife final say household daily needs	0.34	0.14	1.2	0.0
Wife final say visits to family and relatives	0.69	0.09	0.0	0.0
LINEAR REGRESSION: Dependent variable decision making				
<i>Individual level</i>				
Age	0.10	0.03	0.0	0.3
Education	0.03	0.03	37.6	46.8
<i>Household level</i>				
Age difference	0.08	0.01	0.0	2.1
Proportion of household expenditure: <1/2	0.02	0.03	56.3	52.8
Proportion of household expenditure: ≈1/2	0.02	0.02	38.0	30.4
Proportion of household expenditure : >1/2	0.08	0.05	8.9	0.4
Poorer (wealth index)	-0.02	0.02	42.4	69.0
Middle (wealth index)	0.03	0.04	47.5	60.5
Richer (wealth index)	0.06	0.05	21.0	25.7
Richest (wealth index)	-0.03	0.03	28.1	55.4
Difference in wife beating justification	0.16	0.02	0.0	0.1
Polygamy	-0.08	0.02	0.0	2.2
<i>Institutional level</i>				
Urban	0.13	0.02	0.0	0.1
Water	0.01	0.03	66.4	75.5
Christian	0.07	0.05	16.2	9.8
Index husband rights (husband)	-0.04	0.02	1.2	22.2
Index wife beating justification (wife)	-0.25	0.03	0.0	0.0
Tigray	-0.11	0.02	0.0	0.0
Afar	0.03	0.01	0.0	13.9
Amhara	0.02	0.03	35.4	56.1
Somali	-0.22	0.02	0.0	0.0
Ben-Gmuz	-0.03	0.00	0.0	4.1
SNNP	-0.12	0.03	0.0	0.6
Gambela	-0.01	0.00	0.0	11.0
Harari	0.04	0.01	0.0	0.0
Addis Ababa	0.06	0.02	0.2	0.4
Dire Dawa	0.02	0.01	0.8	5.4
R-square			0.23	
LINEAR REGRESSION: Dependent variable body mass index				
<i>Individual level</i>				
Age	0.03	0.05	46.7	20.7
Education	0.10	0.02	0.0	0.0
<i>Household level</i>				
Age difference	-0.02	0.03	41.6	43.7
Poorer (wealth index)	0.01	0.01	36.8	73.6
Middle (wealth index)	0.01	0.01	51.2	86.7
Richer (wealth index)	-0.01	0.03	74.7	80.1
Richest (wealth index)	0.01	0.02	62.2	75.7
Difference in wife beating justification	0.02	0.02	45.0	65.8
Polygamy	-0.02	0.01	4.4	49.0
Decision making index	0.10	0.02	0.0	0.5
<i>Institutional level</i>				
Urban	0.17	0.04	0.0	0.0
Water	-0.05	0.03	8.7	11.2
Christian	-0.02	0.07	72.8	46.9
Index husband rights (husband)	0.02	0.02	21.3	47.3
Index wife beating justification (wife)	0.02	0.03	36.3	53.6
Tigray	-0.08	0.02	0.0	0.0
Afar	-0.02	0.01	0.5	18.2
Amhara	-0.07	0.03	0.9	2.2
Somali	0.00	0.01	87.1	94.0
Ben-Gmuz	-0.04	0.00	0.0	0.0
SNNP	-0.06	0.02	0.4	6.2
Gambela	-0.02	0.00	0.0	1.2
Harari	-0.01	0.00	0.0	5.5
Addis Ababa	0.03	0.02	22.6	36.7
Dire Dawa	-0.01	0.00	2.9	35.4
R-square			0.12	

Notes: N=2344. Dummy is Oromiya. Standardised coefficients.

Source: Demographic Health Surveys Ethiopia 2005.

Table 13. *Decision making power index and anemia regressions.*

ORDERED LOGISTIC: Decision making index				
	Coefficients	Standard errors (clustering)	p-value (clustering)	p-value (no clustering)
Wife final say health	0.62	0.02	0.0	0.0
Wife final say large household purchases	0.58	0.06	0.0	0.0
Wife final say household daily needs	0.34	0.13	1.0	0.0
Wife final say visits to family and relatives	0.69	0.08	0.0	0.0
LINEAR REGRESSION: Dependent variable decision making				
Individual level				
Age	0.10	0.03	0.0	0.2
Education	0.03	0.03	39.1	47.0
Household level				
Age difference	0.08	0.01	0.0	1.9
Proportion of household expenditure: <1/2	0.02	0.03	61.4	58.4
Proportion of household expenditure: ≈1/2	0.02	0.02	43.3	34.6
Proportion of household expenditure : >1/2	0.09	0.04	4.9	0.3
Poorer (wealth index)	-0.02	0.02	41.0	69.7
Middle (wealth index)	0.03	0.04	49.0	60.3
Richer (wealth index)	0.06	0.05	24.5	25.7
Richest (wealth index)	-0.03	0.03	28.1	55.4
Difference in wife beating justification	0.16	0.02	0.0	0.1
Polygamy	-0.08	0.02	0.0	2.4
Institutional level				
Urban	0.13	0.03	0.0	0.1
Water	0.01	0.03	64.9	74.2
Christian	0.07	0.05	13.4	9.1
Index husband rights (husband)	-0.04	0.02	0.4	22.4
Index wife beating justification (wife)	-0.25	0.03	0.0	0.0
Tigray	-0.11	0.02	0.0	0.0
Afar	0.03	0.01	0.0	13.5
Amhara	0.02	0.03	34.3	55.7
Somali	-0.22	0.01	0.0	0.0
Ben-Gmuz	-0.03	0.00	0.0	4.1
SNNP	-0.12	0.02	0.0	0.6
Gambela	-0.01	0.00	0.0	11.1
Harari	0.04	0.01	0.0	0.0
Addis Ababa	0.06	0.02	0.7	0.4
Dire Dawa	0.02	0.01	1.2	5.4
R-square	0.23			
ORDERED LOGISTIC REGRESSION: Dependent variable anemia				
Individual level				
Age	-0.02	0.03	59.5	61.8
Education	0.01	0.03	66.7	73.4
Household level				
Age difference	0.08	0.02	0.0	1.9
Poorer (wealth index)	0.04	0.04	31.1	39.3
Middle (wealth index)	0.05	0.04	21.4	26.2
Richer (wealth index)	0.07	0.06	22.1	14.5
Richest (wealth index)	0.13	0.05	1.9	1.9
Difference in wife beating justification	0.06	0.08	49.9	26.2
Polygamy	0.01	0.02	61.3	77.1
Decision making index	-0.07	0.05	15.3	19.5
Institutional level				
Urban	0.06	0.04	17.0	28.0
Water	0.04	0.01	0.3	33.2
Christian	-0.02	0.04	69.3	70.3
Index husband rights (husband)	0.01	0.03	58.7	68.6
Index wife beating justification (wife)	-0.09	0.11	40.7	6.8
Tigray	0.01	0.02	52.2	59.0
Afar	-0.02	0.00	0.0	16.4
Amhara	0.04	0.02	2.3	32.4
Somali	-0.08	0.02	0.0	2.0
Ben-Gmuz	-0.02	0.00	0.0	13.0
SNNP	0.12	0.01	0.0	0.4
Gambela	-0.01	0.00	0.0	8.0
Harari	0.00	0.01	97.4	98.0
Addis Ababa	0.05	0.02	0.3	14.6
Dire Dawa	0.00	0.00	81.3	92.7
R-square	0.06			

Notes: N=2343. Dummy is Oromiya. Standardised coefficients.

Source: Demographic Health Surveys Ethiopia 2005.

Table 14. *Interactions BMI.*

LINEAR REGRESSION: Dependent variable body mass index							
	Age	Education	Household expenditure	Difference in wife beating justification	Polygamy	Urban	All
Age	0.033 (0.049)					0.01 (0.04)	0.011 (0.045)
Education		0.081*** (0.036)					0.076*** (0.029)
Proportion of household expenditure: <1/2			0.025 (0.045)				0.023 (0.041)
Proportion of household expenditure: ≈1/2			0.039 (0.027)				0.04 (0.027)
Proportion of household expenditure : >1/2			-0.034*** (0.013)				-0.036*** (0.012)
Difference in wife beating justification				0.045*** (0.022)			0.043*** (0.018)
Polygamy					-0.022 (0.026)		-0.023 (0.012)
Decision making	0.094 (0.059)	0.12*** (0.024)	0.107*** (0.022)	0.1*** (0.024)	0.105*** (0.02)		0.088 (0.062)
Urban						-0.145 (0.178)	-0.141 (0.18)
<i>Interactions</i>							
Age x decision making	-0.01 (0.061)						-0.024 (0.061)
Education x decision making		0.036 (0.025)					0.04*** (0.019)
Proportion of household expenditure: <1/2 x decision making			0.012 (0.031)				0.01 (0.025)
Proportion of household expenditure: ≈1/2 x decision making			-0.023 (0.019)				-0.023 (0.018)
Proportion of household expenditure : >1/2 x decision making			0.015 (0.036)				-0.001 (0.039)
Difference in wife beating justification x decision making				-0.045*** (0.015)			-0.043*** (0.016)
Polygamy x decision making					0.001 (0.027)		0 (0.024)
Age x urban						0.33*** (0.16)	0.33*** (0.16)

Notes: In brackets () corrected standard errors. *** significant at 5%.

Source: Demographic Health Surveys Ethiopia 2005.

Table 15. *Interactions anemia.*

ORDERED LOGISTIC REGRESSION: Dependent variable anemia							
	Age	Education	Household expenditure	Difference in wife beating justification	Polygamy	Urban	All
Age	-0.014 (0.031)					-0.011 (0.034)	-0.004 (0.029)
Education		0.009 (0.079)					-0.005 (0.028)
Proportion of household expenditure: <1/2			-0.075 (0.053)				-0.074 (0.051)
Proportion of household expenditure: ≈1/2			0.044 (0.032)				0.042 (0.033)
Proportion of household expenditure : >1/2			0.008 (0.011)				0.008 (0.013)
Difference in wife beating justification				0.036 (0.089)			0.043 (0.09)
Polygamy					-0.26 (0.154)		-0.039 (0.024)
Decision making	-0.093*** (0.046)	-0.079 (0.064)	-0.059 (0.044)	-0.065 (0.049)	-0.069 (0.071)		-0.089*** (0.041)
Urban						0.202*** (0.097)	0.207*** (0.097)
<i>Interactions</i>							
Age x decision making	-0.022 (0.037)						-0.056 (0.037)
Education x decision making		0.024 (0.013)					0.039*** (0.019)
Proportion of household expenditure: <1/2 x decision making			0.117 (0.074)				0.116 (0.074)
Proportion of household expenditure: ≈1/2 x decision making			-0.047 (0.036)				-0.044 (0.036)
Proportion of household expenditure : >1/2 x decision making			-0.036*** (0.01)				-0.037*** (0.016)
Difference in wife beating justification x decision making				0.035 (0.025)			0.036 (0.025)
Polygamy x decision making					0.07 (0.047)		0.074 (0.054)
Age x urban						-0.143*** (0.07)	-0.12 (0.076)

Notes: In brackets () corrected standard errors. *** significant at 5%.

Source: Demographic Health Surveys Ethiopia 2005.

REFERENCES

- Abadian, S. (1996) Women's autonomy and its impact on fertility, *World Development*, **24**, pp. 1793-1809.
- Abate, Y. (1993) 'The society and its environment', in Thomas Ofcansky and LaVerle Berry (eds.) *Ethiopia, a Country Study*, Kessinger Publishing.
- Agarwal, B. (1994) *A Field of One's Own. Gender and Land Rights in South Asia*, Cambridge University Press.
- Agarwal, B. (1997) "Bargaining" and gender relations: Within and beyond the household, Food and Consumption Nutrition Division Discussion Paper No.27.
- Alkire, S. (2005) Subjective quantitative studies of human agency, *Social Indicators Research*, **74**, pp. 217-260.
- Behrman, J., and Deolalikar, A. (1989) 'Agricultural wages in India: The role of health, nutrition, and seasonality', in David Sahn, (ed.) *Seasonal Variability in Third World Agriculture: The Consequences for Food Security*, IFPRI.
- Berhane, Y., Gossaye, Y., Emmelin, M., Hogberg, U. (2001) Women's health in a rural setting in societal transition in Ethiopia, *Social Science and Medicine*, **53**, p. 1525-1539.
- Bhargava, A. (1997) Nutritional status and the allocation of time in Rwandese households, *Journal of Econometrics*, **77**, pp. 277-295.
- Balk, D. (1994) Individual and community aspects of women's status and fertility in rural Bangladesh, *Populations Studies*, **48**, pp. 21-45.
- Becker, S. (1997) Incorporating women's empowerment in studies of reproductive health: an example from Zimbabwe, paper presented at the Seminar on Female Empowerment and Demographic Processes, Lund.
- Bentler, Peter, (2006) *EQS 6 Structural Equations Programme Manual*.
- Berhane, Y., Gossaye, Y., Emmelin, M., and Hogberg, U. (2001) Women's health in a rural setting in societal transition in Ethiopia, *Social Science and Medicine*, **53**, pp. 1525-1539.
- Biseswar, I. (2008) Problems of feminist leadership among educated women in Ethiopia, *Journal of Development Societies*, **24**, pp.125-158.

- Bruce, J., and Dwyer, D. (1988) *A Home Divided: Women and Income in The Third World*, Stanford University Press.
- Dasgupta, P. (1993) *An Inquiry into Well-Being and Destitution*, Clarendon Press.
- Dercon, S. (1999) Poverty and deprivation in Ethiopia, World Bank.
- Dercon, S., Krishnan, P. (2000) In sickness and in health: Risk sharing within households in rural Ethiopia, *Journal of Political Economy*, **108**, pp. 688-727.
- Di Tommaso, M. (2007) Children capabilities: A structural equation model for India, *The Journal of Socio-Economics*, **36**, pp. 436-450.
- Ensor, T., Cooper, S. (2004) Overcoming barriers to health services access: Influencing the demand side, *Health Policy and Planning*, **19**, pp. 69-78.
- Fafchamps, M., Quisumbing, A., (2005) Control and ownership of assets within rural Ethiopian households, Working Paper.
- Farah, M., Noble, K., Hurt, H. (2005) 'Poverty, privilege and brain development: Empirical findings and ethical implications', in J. Illes (ed.) *Neuroethics in the 21st Century*. Oxford University Press.
- Ferro-Luzzi, A., Branca, F., and Pastore, G. (1994) Body mass index defines the risk of seasonal energy stress in the third world, *European Journal of Clinical Nutrition*, **48**.
- Ferro-Luzzi, A., Morris, S., Taffesse, S., Demissie, T., D'Amato, M. (2001) *Seasonal Undernutrition in rural Ethiopia*, IFPRI.
- Fogel, R. (1994) Economic growth, population theory, and physiology: The bearing of long-term processes on the making of economic policy, *American Economic Review*, **84**, pp. 369-395.
- Furr, A., Nandita, D. (2006) The effects of social autonomy on BMI scores: a study of women in Nepal, *Contributions to Nepalese Studies*.
- Furuta, M., and Salway, S. (2006) Women's position within the household as a determinant of maternal healthcare use in Nepal, *International Family Planning Perspectives*, **32**, pp. 17-27.
- Garikipati, S. (2008) The impact of lending to women on household vulnerability and women's empowerment: Evidence from India, *World Development*, **36**, pp. 2620-2642.
- Germain, A. (1975) The status and role of women as factors in fertility behaviour: a policy analysis, *Studies in Family Planning*, **6**, pp. 192-200.

- Giay, T., Khoi, H. (1994) Use of body mass index in the assessment of adult nutritional status in Vietnam, *European Journal of Clinical Nutrition*, **48**.
- Goetz, A., and Sen Gupta R. (1996) Who takes the credit? Gender, power and control over loan use in rural credit programmes in Bangladesh, *World Development*, **24**, pp. 45-63.
- Hossain, Z. (1998) Decision making, use of contraception and fertility in Bangladesh: A path analysis, *International Journal of Sociology and Social Policy*, **18**, pp. 26-54.
- ICRW (International Center for Research on Women), (1997), Women's role in household decision-making: a case study in Nigeria, Washington, DC.
- James, W. (1994) Introduction: The challenge of adult chronic energy deficiency, in *European Journal of Clinical Nutrition*, **48**.
- Jejeebhoy, S. (1995) *Women's education, autonomy, and reproductive behaviour: experience from developing countries*, Oxford University Press.
- Kabeer, N. (1999) Resources, agency, achievements: reflections on the measurement of women's empowerment, *Development and Change*, **30**, pp. 435-464.
- Kabeer, N. (2005) Gender equality and human development: The instrumental rationale, Human Development Report Office Occasional Paper.
- Kabira W., Gachukia, E., and Matiangi, F. (1997) The effect of women's role on health: The Paradox, *International Journal of Gynecology and Obstetrics*, **58**, pp. 23-34.
- Kamal, N. (2000) The influence of husband on contraceptive use by Bangladeshi women, *Health Policy and Planning*, **15**, pp. 43-51.
- Kaplan, D. (2000) *Structural Equations Modeling*, Sage.
- Kennedy, E., Garcia, M. (1994) Body mass index and economic productivity, *European Journal of Clinical Nutrition*, **48**.
- Krishnakumar, J. (2007) Going beyond functionings to capabilities: An econometric model to explain and estimate capabilities, *Journal of Human Development*, **8**, pp. 39-63.
- Krishnakumar, J., Ballon, P. (2008) Estimating basic capabilities: A structural equation model applied to Bolivia, *World Development*, **36**, pp. 992-1010.
- Kuklys, W. (2005) *Amartya Sen's Capability Approach. Theoretical Insights and Empirical Application*, Springer.

- Kuklys, W., and Robeyns, I. (2005) 'Sen's capability approach to welfare economics, in Wiebke Kuklys, *Amartya Sen's Capability Approach. Theoretical Insights and Empirical Application*, Springer.
- Legovini, A. (2006) Measuring women's empowerment in Ethiopia: The women's development initiatives project', in Ruth Alsop, Metter Bertelsen, and Jeremy Holland (eds.), *Empowerment in Practice: From Analysis to Implementation*, World Bank.
- Laverack, G., Labonte, R. (2000) A planning framework for community empowerment goals and within health promotion, *Health and Policy Planning*, **15**, pp. 255-262.
- Levine, D. (1965) *Wax and Gold*, University of Chicago Press.
- Liere, M., Atebgo, E., Hoorweg, E., Den Hartog, A., Hautvat, J. (1994) The significance of socio-economic characteristics for adult seasonal body-weight fluctuations: a study in north-western Benin, *British Journal of Nutrition*, **72**, pp. 472-488.
- Lim, S., Winter-Nelson, A., Arends-Keunings, M. (2007) Household bargaining power and agricultural supply response: Evidence from eEthiopian coffee growers, *World Development*, **35**, pp. 1204-1220.
- Mulugeta, E. (2007) Trajectory of the Institute of Gender Studies at Addis Ababa University, Ethiopia, *Feminist Africa*, **9**.
- Muthén, Bengt and Muthén, Linda (2008) MPLUS User's Guide, Muthén & Muthén.
- Odebo, S., and Staveren, I. (2007) Gender norms as asymmetric institutions. a case study of Yoruba women in Nigeria, *Journal of Economic Issues*, **41**, pp. 903-925.
- OECD (2008a) Gender Institutions and Development Data Base, Paris.
- OECD (2008b) *African Economic Outlook. Ethiopia*, Paris.
- Pankhurst, H. (2002) *Gender, Development, and Identity*, Zed Books.
- Pelletier, D., Rahn, M. (1998) Trends in body mass index in developing countries, *Food and Nutrition Bulletin*, **19**.
- Pitt, M., Rosenzweig, M., and, H, Nazmul. (1990) Productivity, health and inequality in the intra-household distribution of food in low-income countries. *American Economic Review*, **80**, 1139-1156.
- Presser, H. (1997) Demography, feminism, and the science-policy nexus, *Population and Development Review*, **23**, pp. 295-331.

- Rahman, A. (1999) Micro-credit initiatives for equitable and sustainable development: who pays?, *World Development*, **27**, pp. 67-82.
- Quisumbing, A., and Maluccio, J. (2000) Intrahousehold allocation and gender relations: New empirical evidence from four developing countries, FCND Discussion Paper, 84.
- Quisumbing, A., and Maluccio, J. (2003) Resources at marriage and intrahousehold allocation: evidence from Bangladesh, Ethiopia, Indonesia, and South Africa, *Oxford Bulletin of Economics & Statistics*.
- Rispin, P. (1998) Combating iron deficiency in Ethiopia: Exploring the link between iron supplementation and malaria, The International Research Development Center.
- Robeyns, I. (2005). The capability approach: A theoretical survey, *Journal of Human Development*, **6**, pp. 93-114.
- Sahn, D., Alderman, H. (1988) The effects of human capital on wages, and the determinants of labor supply in a developing country, *Journal of Development Economics*, **29**, pp. 157-183.
- Scrimshaw, N. (1996) Nutrition and health from womb to tomb, *Nutrition Today*.
- Sen, A. (1985) 'Rights and capabilities', reprinted in Amartya Sen, *Resources, Values and Development*, Oxford University Press.
- Sen, A. (1990) Gender and cooperative conflict, in *Persistent Inequalities. Women and World Development*, Irene Tinker (ed.), Oxford University Press.
- Sen, A. (1992) *Inequality Reexamined*, Oxford University Press.
- Sen, A. (1993) 'Capability and well-being', in Martha Nussbaum and Amartya Sen (eds.), *The Quality of Life*, Clarendon Press.
- Sen, A. (1999) *Development as Freedom*, Anchor Books.
- Sen, A. (2008) 'The economics of happiness and capability', in Luigi Bruni, Falvio Comim, and Maurizio Pugno, (eds.) *Capabilities and Happiness*, Oxford University Press.
- Shetty, P., Soares, M., James, W. (1994) Body mass index: its relationship to basal metabolic rates and energy requirements, *European Journal of Clinical Nutrition*, **48**.
- Smith, H. (1989) Integrating theory and research on the institutional determinants of. Fertility, *Demography*, **26**, pp.171-183.

- Strauss, J., Thomas, D. (1998) Health, nutrition, and economic development, *Journal of Economic Literature*, **36**, pp. 766-817.
- Thomas, D. (1990) Intra-household resource allocation: An inferential approach, *Journal of Human Resources*, **25**, pp. 635-664.
- Thomas, D., Contreras, D., and Frankenberg, E. (2002) Distribution of power within the household and child health, Working Paper.
- UNDP (United Nation Development Programme) (2008/9) Human Development Report, Oxford University Press.
- UNICEF (2008) Ethiopia: Child survival gains threatened by malnutrition, News note.
- USDA. (2006) *Crop calendar of Ethiopia*.
- University of Maryland Medical Center (accessed 30/08/2008).
- Webb, P., and von Braun, J. (1994) *Famine and Food Security in Ethiopia: Lessons for Africa*, John Wiley and Sons.
- WHO (World Health Organisation) (1999) *An assessment of reproductive health needs in Ethiopia*, Geneva.
- World Food Programme. (2005) Food needs and new safety programme in Ethiopia.
- Williams, J. (2005) Measuring gender and women's empowerment using confirmatory factor analysis, Institute of Behavioral Science Working Paper.

ⁱ A third possibility introduced by Samuelson is decision making by consensus (see Thomas, 1990).

ⁱⁱ Unless otherwise specified, the data source is UNDP (2008/9).

ⁱⁱⁱ The share of women in government at ministerial level in 2005 was 5.9% while they held 21.9% of all seats in parliament in 2007 (the sixth highest rate among low human development countries) and 18% in upper house or senate.

^{iv} Weight must be applied to make the regional distribution nationally representative.

^v The analysis with maximum likelihood can be computationally demanding when more than one categorical factor model is added. However, a model with all the factors estimated simultaneously using weighted least square provides equivalent results.

^{vi} In southern Ethiopia, the period May – August is the worst in terms of food shortage (Ferro-Luzzi et. al., 2001:11).

^{vii} The difference in age at first marriage is confirmed by the DHS dataset.

^{viii} However, it should be noted, Furr and Das (2006) censored BMI at the critical value of 18.5. In the next sub-section their hypothesis is considered. Their measure of decision making autonomy includes who has final say on own health care, large household purchases, everyday household purchases, making family visits, and what food to cook.

^{ix} The positive sign implies older women have a higher probability of a BMI<18.5. This corroborates Ferro-Luzzi et. al. (2001:42) finding that women's energy reserves are depleted in their late 40s. They argue this may be due to child bearing and rearing or to re-allocation of resources within the household to those who generate most economic resources. Berhane et. al (2001:1533) report that, relative to younger women, older

women in southern rural Ethiopia claim more often heavy work loads have adversely affected their health status. But Ferro-Luzzi et. al. (2001:44) also found chronic undernutrition in younger women and men (<25 years). It is possible the young are deprived because of incomplete accumulation of muscle mass, a heavy work load, and little control over food distribution. Likewise, women are also at risk of seasonal (not chronic) undernutrition at age 30-35 years possibly due to a demanding post harvest work schedule, and a dwindling unfavourable distribution of food.

^x However, it is not possible to know whether these women contribute more than men more because they have low decision making power in the household and have to care for themselves or low decision making power is a consequence of their high contributions.

^{xi} The family code is the complex of formal and informal laws, customs, and traditions that constrain women's economic participation; prevalence of female genital mutilation (share of women affected: 0=none, 1=all); violence against women quantifies information on the existence of laws against (i) domestic violence, (ii) sexual assault or rape, and (iii) sexual harassment as follows: 0 if specific legislation is in place, 0.25 if legislation is in place but of general nature, 0.5 if specific legislation is being planned, drafted or reviewed, and 0.75 if this planned legislation is of general nature; 1 captures the absence of any legislation concerning violence against women; missing women describes the difference between the number of women that should be alive (assuming gender equality) and the actual number of women in a country. A value of 1 was assigned to the country with the highest percentage of missing women relative to the total number of women. All other countries are assigned values between 0 (no women are missing) and 1 accordingly; freedom to move freely outside of the house (level of discrimination between 0=none and 1=high); obligation to wear a veil in public. Level of discrimination between 0=women are not obliged to wear a veil and 1=all women are obliged to wear a veil; women's access to land ownership (between 0=full and 1=impossible); women's access to bank loans (between 0=full and 1=impossible); women's rights to own property other than land (between 0=full and 1=no).